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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



Applicant(s): Rajandra R. Damle
Assignee: Ceterus Networks, Inc.
Title: FRAME STRUCTURE AND METHOD FOR WAVELENGTH
CONCATENATED CHANNEL FRAMING
Serial No.: Unassigned Filed: Herewith
Examiner: Unassigned Group Art Unit: Unassigned
Docket No.: CET0006C1US

Austin, Texas
August 27, 2004

COMMISSIONER FOR PATENTS
P. O. Box 1450
Washington, D. C. 20231

PRELIMINARY AMENDMENT AND REMARKS

Dear Sir:

The following Preliminary Amendment and Remarks are submitted for entry into the continuing application filed herewith (this application being a continuation from application serial number 10/086,273 filed February 20, 2002). Further examination and consideration are requested.

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

No Amendments to the Drawings are presented in this paper.

Remarks begin on page 18 of this paper.

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Amendments to the Specification

Please replace the paragraph on page 1, lines 5-10, with the following amended paragraph:

This application is a continuation of U. S. Patent Application Serial No. 10/086,273, entitled "FRAME STRUCTURE AND METHOD FOR WAVELENGTH CONCATENATED CHANNEL FRAMING," filed on February 20, 2002, and having Rajendra R. Damle as the inventor, which is a continuation-in-part of Patent Application Serial No. 10/074,264 [____ Attorney Docket Number M-9927—US—____], entitled "TRANSPORT OF HIGH-BANDWIDTH DATASTREAMS OVER A NETWORK," filed on Feb. 12, 2002, and having R. Damle, Y. Lee, W. Szeto, R. Butler and H. M. Zadikian as inventors, which, in turn, claims priority from the following provisional patent applications under 35 U.S.C. §119(e):

Please delete the first full paragraph under the header "SUMMARY OF THE INVENTION," starting at the bottom of page 4. Please insert the following paragraphs following the header "SUMMARY OF THE INVENTION", in the location of deleted paragraphs:

The present invention presents a method, device, and apparatus that provide a means for generating a network frame that provides information related to one or more super-channels for data transmission, which are comprised of one or more sub-channels for data transmission, over which the network frame is transmitted.

Accordingly, one aspect of the present invention provides a method for generating a frame, wherein the frame has a frame structure. The frame structure comprises information regarding a super-channel. The super-channel is comprised of one or more sub-channels.

Another aspect of the present invention provides a network device comprising a frame generator. The frame generator is configured to generate a frame having a

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frame structure. The frame structure comprises information regarding a super-channel. The super-channel is comprised of one or more sub-channels.

A further aspect of the present invention provides an apparatus comprising a means for generating a frame. The frame has a frame structure that comprises information about a super-channel. The super-channel is comprised of one or more sub-channels.

On page 58, please cancel the Abstract. Please replace the Abstract with the following:

A method, device, and apparatus that provide a means for generating a network frame that provides information related to one or more super-channels for data transmission, which are comprised of one or more sub-channels for data transmission, over which the network frame is transmitted are disclosed.

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Amendments In the Claims

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Please cancel claims 1-19. Please add claims 20-86 as follows:

1-19. Cancelled

20. (New) A method comprising:

generating a frame, wherein the frame has a frame structure,

the frame structure comprises information regarding a super-channel,

and

the super-channel is comprised of one or more sub-channels.

21. (New) The method of Claim 20 wherein generating a frame comprises:

inserting a primary super-channel identifier into the frame structure.

22. (New) The method of Claim 21, wherein

the primary super-channel identifier identifies the frame structure as an Alarm

Indication Signal (AIS) frame.

23. (New) The method of Claim 21, wherein

the primary super-channel identifier identifies a primary super-channel

associated with the frame structure.

24. (New) The method of Claim 23 wherein generating a frame further comprises:

inserting a sub-channel identifier into the frame structure, wherein

the sub-channel identifier identifies a sub-channel of the primary

super-channel; and

the sub-channel identifier identifies a sub-channel associated with the

frame structure.

25. (New) The method of Claim 24, wherein the sub-channel identifier comprises:

an active bit, wherein

the active bit identifies whether the sub-channel can transmit data.

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26. (New) The method of Claim 24 wherein generating a frame further comprises:
- inserting a frame counter into the frame structure, wherein
- the frame counter uniquely identifies the frame at about the time the frame is generated.
27. (New) The method of Claim 26, wherein
- the frame counter is reset when a first frame is generated and when the frame counter reaches a maximum value.
28. (New) The method of Claim 26 wherein generating a frame further comprises:
- inserting an alternate super-channel identifier into the frame structure.
29. (New) The method of Claim 28, wherein
- the alternate super-channel identifier identifies an alternate super-channel on which to transmit the frame structure.
30. (New) The method of Claim 29 wherein generating a frame further comprises:
- generating a super-channel sub-channel bitmap, wherein
- the super-channel is one of the primary super-channel and the alternate super-channel, and
- the bitmap provides a status of each sub-channel that comprises the super-channel; and
- inserting the super-channel sub-channel bitmap into the frame structure.
31. (New) The method of Claim 30 wherein generating a super-channel sub-channel bitmap comprises for each sub-channel that comprises the super-channel:
- selecting a sub-channel that comprises the super-channel;
- determining whether the selected sub-channel is degraded;
- upon a determination that the selected sub-channel is degraded, setting a status flag corresponding to the selected sub-channel; and
- upon a determination that the selected sub-channel is not degraded, clearing the status flag corresponding to the selected sub-channel.

32. (New) The method of Claim 31, wherein
a super-channel sub-channel bitmap is generated for each of the primary
super-channel and the alternate super-channel.

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33. (New) The method of Claim 32 wherein generating a frame further
comprises:

generating an error flag field, wherein
the error flag field corresponds to the sub-channel upon which the
frame structure is transmitted; and
inserting the error flag field into the frame structure.

34. (New) The method of Claim 33 wherein generating an error flag field
comprises:

determining whether the sub-channel is to be forced to switch;
upon a determination that the sub-channel is to be forced to switch, setting a
forced/manual switch flag in the error flag field; and
upon a determination that the sub-channel is not to be forced to switch,
clearing the forced/manual switch flag.

35. (New) The method of Claim 34 wherein generating an error flag field
further comprises:

determining whether a bit error rate (BER) for the sub-channel is above a
threshold;
upon a determination that the BER for the sub-channel is above the threshold,
setting a BER flag in the error flag field; and
upon a determination that the BER for the sub-channel is not above the
threshold, clearing the BER flag.

36. (New) The method of Claim 34 wherein generating an error flag field
further comprises:

determining whether a loss-of-signal (LOS) has occurred on the sub-channel;
upon a determination that a LOS has occurred, setting a LOS flag in the error
flag field; and
upon a determination that a LOS has not occurred, clearing the LOS flag.

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37. (New) The method of Claim 34 wherein generating an error flag field further comprises:

determining whether a loss-of-frame (LOF) has occurred on the sub-channel;
upon a determination that a LOF has occurred, setting a LOF flag in the error flag field; and
upon a determination that a LOF has not occurred, clearing the LOF flag.

38. (New) The method of Claim 34 wherein generating an error flag field further comprises:

determining whether a cyclic redundancy check (CRC) error has occurred on the sub-channel;
upon a determination that a CRC error has occurred, setting a CRC error flag in the error flag field; and
upon a determination that a CRC error has not occurred, clearing the CRC error flag.

39. (New) The method of Claim 34 wherein generating an error flag field further comprises:

determining whether to generate a remote defect indicate (RDI) in response to receipt of an alarm indication signal;
upon a determination that a RDI needs to be generated, setting an RDI flag in the error flag field; and
upon a determination that a RDI does not need to be generated, clearing the RDI flag.

40. (New) The method of Claim 34 wherein generating a frame further comprises:

generating a label-switched path (LSP) switch field for each of the primary super-channel and the alternate super-channel; and
inserting the LSP switch field into the frame structure.

41. (New) The method of Claim 40 wherein generating a LSP switch field comprises:

determining whether a super-channel needs configuring, wherein

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the super-channel is one of the primary super-channel and alternate super-channel;
 in response to a determination that the super-channel needs configuring,
 determining a number of sub-channels that comprise the super-channel that are functional,
 using the number of functional sub-channels that comprise the super-channel to determine an amount of guaranteed bandwidth traffic that can be accepted for the super-channel, and
 using the amount of guaranteed bandwidth traffic that can be accepted for the super-channel, to determine the LSP switch field value.

42. (New) The method of Claim 41 wherein determining the LSP switch field value comprises:

monitoring the primary super-channel for error conditions in the sub-channels that comprise the super-channel;

in response to a number of error conditions in the sub-channels exceeding a threshold,

setting the LSP switch field to a value corresponding to alternate operation, wherein

alternate operation comprises switching guaranteed bandwidth traffic to the alternate super-channel,

wherein,

the threshold corresponds to a number of error conditions in the sub-channels sufficient to cause the bandwidth of the primary super-channel to be insufficient to provide the guaranteed bandwidth;

in response to a number of error conditions on the primary super-channel being less than the threshold,

setting the LSP switch field to a value corresponding to normal operation.

43. (New) The method of Claim 42 wherein monitoring the primary super-channel for error conditions in the sub-channels that comprise the super-channel comprises:

analyzing the super-channel sub-channel bitmap corresponding to the primary super-channel.

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44. (New) The method of Claim 40 wherein generating a frame further comprises:

inserting payload data units into the frame structure.

45. (New) The method of Claim 44 wherein generating a frame further comprises:

inserting a byte-interleaved parity value (BIP8 value) calculated for a previously generated frame into the frame structure.

46. (New) A network device comprising:

a frame generator configured to generate a frame, wherein the frame has a frame structure,

the frame structure comprises information regarding a super-channel,

and

the super-channel is comprised of one or more sub-channels.

47. (New) The network device of Claim 46 wherein the frame generator is further configured to

insert a primary super-channel identifier into the frame structure.

48. (New) The network device of Claim 47, wherein

the primary super-channel identifier identifies a primary super-channel associated with the frame structure.

49. (New) The network device of Claim 48 wherein the frame generator is further configured to

insert a sub-channel identifier into the frame structure, wherein

the sub-channel identifier identifies a sub-channel of the primary super-channel; and

the sub-channel identifier identifies a sub-channel associated with the frame structure.

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50. (New) The network device of Claim 49 wherein the frame generator is further configured to

insert a frame counter into the frame structure, wherein
the frame counter uniquely identifies the frame at about the time the
frame is generated.

51. (New) The network device of Claim 50 wherein the frame generator is further configured to

insert an alternate super-channel identifier into the frame structure.

52. (New) The network device of Claim 51, wherein
the alternate super-channel identifier identifies an alternate super-channel on
which to transmit the frame structure.

53. (New) The network device of Claim 52 wherein the frame generator is further configured to

generate a super-channel sub-channel bitmap, wherein
the super-channel is one of the primary super-channel and the alternate
super-channel, and
the bitmap provides a status of each sub-channel that comprises the
super-channel; and
insert the super-channel sub-channel bitmap into the frame structure.

54. (New) The network device of Claim 53, wherein
each bit in the super-channel sub-channel bitmap represents an operational
state of a corresponding sub-channel.

55. (New) The network device of Claim 54, wherein
a super-channel sub-channel bitmap is generated for each of the primary
super-channel and the alternate super-channel.

56. (New) The network device of Claim 55 wherein the frame generator is further configured to

generate an error flag field, wherein
the error flag field corresponds to the sub-channel upon which the
frame structure is transmitted; and

insert the error flag field into the frame structure.

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57. (New) The network device of Claim 56, wherein the error flag field comprises:

- a bit error rate flag;
- a loss-of-signal flag;
- a loss-of-frame flag; and
- a cyclic redundancy check error flag.

58. (New) The network device of Claim 57, wherein the error flag field further comprises:

- a remote defect indicate flag.

59. (New) The network device of Claim 56 wherein the frame generator is further configured to

- generate a label-switched path (LSP) switch field for each of the primary super-channel and the alternate super-channel; and
- insert the LSP switch field into the frame structure.

60. (New) The network device of Claim 59, wherein the LSP switch field is configured to indicate which of the primary super-channel and the alternate super-channel should carry a guaranteed bandwidth data signal.

61. (New) The network device of Claim 59 wherein the frame generator is further configured to

- insert a payload data unit into the frame structure.

62. (New) The network device of Claim 61 wherein the frame generator is further configured to

- insert a byte-interleaved parity value calculated for a previously generated frame into the frame structure.

63. (New) A apparatus comprising:

means for generating a frame, wherein the frame has a frame structure,

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the frame structure comprises information regarding a super-channel,
and
the super-channel is comprised of one or more sub-channels.

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64. (New) The apparatus of Claim 63 wherein the means for generating a frame comprises:
means for inserting a primary super-channel identifier into the frame structure.

65. (New) The apparatus of Claim 64, wherein
the primary super-channel identifier identifies the frame structure as an Alarm Indication Signal (AIS) frame.

66. (New) The apparatus of Claim 64, wherein
the primary super-channel identifier identifies a primary super-channel associated with the frame structure.

67. (New) The apparatus of Claim 66, wherein the means for generating a frame further comprises:
means for inserting a sub-channel identifier into the frame structure, wherein
the sub-channel identifier identifies a sub-channel of the primary super-channel; and
the sub-channel identifier identifies a sub-channel associated with the frame structure.

68. (New) The apparatus of Claim 67 wherein the means for generating a frame further comprises:
means for inserting a frame counter into the frame structure, wherein
the frame counter uniquely identifies the frame at about the time the frame is generated.

69. (New) The apparatus of Claim 68, wherein the means for inserting a frame counter further comprises:
means for resetting the frame counter when a first frame is generated and
when the frame counter reaches a maximum value.

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70. (New) The apparatus of Claim 68 wherein the means for generating a frame further comprises:

means for inserting an alternate super-channel identifier into the frame structure.

71. (New) The apparatus of Claim 70, wherein the alternate super-channel identifier identifies an alternate super-channel on which to transmit the frame structure.

72. (New) The apparatus of Claim 71 wherein the means for generating a frame further comprises:

means for generating a super-channel sub-channel bitmap, wherein the super-channel is one of the primary super-channel and the alternate super-channel, and the bitmap provides a status of each sub-channel that comprises the super-channel; and means for inserting the super-channel sub-channel bitmap into the frame structure.

73. (New) The apparatus of Claim 72 wherein the means for generating a super-channel sub-channel bitmap comprises:

means for selecting a sub-channel that comprises the super-channel; means for determining whether the selected sub-channel is degraded; means, responsive to a determination that the selected sub-channel is degraded, for setting a status flag corresponding to the selected sub-channel; and means, responsive to a determination that the selected sub-channel is not degraded, for clearing the status flag corresponding to the selected sub-channel.

74. (New) The apparatus of Claim 72 wherein the means for generating a frame further comprises:

means for generating an error flag field, wherein the error flag field corresponds to the sub-channel upon which the frame structure is transmitted; and

means for inserting the error flag field into the frame structure.

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75. (New) The apparatus of Claim 74 wherein the means for generating an error flag field comprises:

means for determining whether the sub-channel is to be forced to switch;
means, responsive to a determination that the sub-channel is to be forced to switch, for setting a forced/manual switch flag in the error flag field;
and
means, responsive to a determination that the sub-channel is not to be forced to switch, for clearing the forced/manual switch flag.

76. (New) The apparatus of Claim 75 wherein the means for generating an error flag field further comprises:

means for determining whether a bit error rate (BER) for the sub-channel is above a threshold;
means, responsive to a determination that the BER for the sub-channel is above the threshold, for setting a BER flag in the error flag field; and
means, responsive to a determination that the BER for the sub-channel is not above the threshold, for clearing the BER flag.

77. (New) The apparatus of Claim 75 wherein the means for generating an error flag field further comprises:

means for determining whether a loss-of-signal (LOS) has occurred on the sub-channel;
means, responsive to a determination that a LOS has occurred, for setting a LOS flag in the error flag field; and
means, responsive to a determination that a LOS has not occurred, for clearing the LOS flag.

78. (New) The apparatus of Claim 75 wherein the means for generating an error flag field further comprises:

means for determining whether a loss-of-frame (LOF) has occurred on the sub-channel;
means, responsive to a determination that a LOF has occurred, for setting a LOF flag in the error flag field; and

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means, responsive to a determination that a LOF has not occurred, for clearing the LOF flag.

79. (New) The apparatus of Claim 75 wherein the means for generating an error flag field further comprises:

means for determining whether a cyclic redundancy check (CRC) error has occurred on the sub-channel;
 means, responsive to a determination that a CRC error has occurred, for setting a CRC error flag in the error flag field; and
 means, responsive to a determination that a CRC error has not occurred, for clearing the CRC error flag.

80. (New) The apparatus of Claim 75 wherein the means for generating an error flag field further comprises:

means for determining whether to generate a remote defect indicate (RDI) in response to receipt of an alarm indication signal;
 means, responsive to a determination that a RDI needs to be generated, for setting an RDI flag in the error flag field; and
 means, responsive to a determination that a RDI does not need to be generated, for clearing the RDI flag.

81. (New) The apparatus of Claim 75 wherein the means for generating a frame further comprises:

means for generating a label-switched path (LSP) switch field for each of the primary super-channel and the alternate super-channel; and
 means for inserting the LSP switch field into the frame structure.

82. (New) The apparatus of Claim 81 wherein the means for generating a LSP switch field comprises:

means for determining whether a super-channel needs configuring, wherein the super-channel is one of the primary super-channel and alternate super-channel; and
 means, responsive to a determination that the super-channel needs configuring,

for determining a number of sub-channels that comprise the super-channel that are functional,
for determining an amount of guaranteed bandwidth traffic that can be accepted for the super-channel, using the number of functional sub-channels that comprise the super-channel, and
for determining the LSP switch field value, using the amount of guaranteed bandwidth traffic that can be accepted for the super-channel.

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83. (New) The apparatus of Claim 82 wherein the means for determining the LSP switch field value comprises:

means for monitoring the primary super-channel for error conditions in the sub-channels that comprise the super-channel;
means, responsive to a number of error conditions in the sub-channels exceeding a threshold, for setting the LSP switch field to a value corresponding to alternate operation, wherein
alternate operation comprises switching guaranteed bandwidth traffic to the alternate super-channel,

wherein,

the threshold corresponds to a number of error conditions in the sub-channels sufficient to cause the bandwidth of the primary super-channel to be insufficient to provide the guaranteed bandwidth;

means, responsive to a number of error conditions on the primary super-channel being less than the threshold, for setting the LSP switch field to a value corresponding to normal operation.

84. (New) The apparatus of Claim 83 wherein the means for monitoring the primary super-channel for error conditions in the sub-channels that comprise the super-channel comprises:

means for analyzing the super-channel sub-channel bitmap corresponding to the primary super-channel.

85. (New) The apparatus of Claim 81 wherein the means for generating a frame further comprises:

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means for inserting payload data units into the frame structure.

86. (New) The apparatus of Claim 85 wherein the means for generating a frame further comprises:

means for inserting a byte-interleaved parity value (BIP8 value) calculated for a previously generated frame into the frame structure.

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REMARKS

Claims 20-86 are pending. Original claims 1-19 have been canceled. New claims 20-86 have been added. The specification has been amended to reflect the fact that the present application is a continuation of application Serial Number 10/086,273 and its genealogy and to revise the summary and abstract. No new matter has been added.

Because no new matter has been added by these claims, Applicants respectfully submit that the above-referenced continuation application is entitled to claim the same priority as that of parent application Serial Number 10/086,273, filed on February 20, 2002.

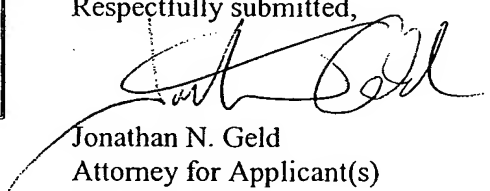
CONCLUSION

In view of the amendments and remarks set forth herein, the application and the claims therein are believed to be in condition for allowance without any further examination and a notice to that effect is solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is invited to telephone the undersigned at 512-439-5090.

EXPRESS MAIL LABEL NO:

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Respectfully submitted,


Jonathan N. Geld
Attorney for Applicant(s)
Reg. No. 44,702

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